CASIO®

Service Manual

(with price)

AP-20

INDEX

ELECTRONIC KEYBOARD

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SAFETY NOTICE

CAUTION!
Danger of explosion if battery is incorrectly replaced.
Replace only with the same of equivalent type recommended by the appliance manufacturer.Discard used batteries according to manufacturer's instructions.

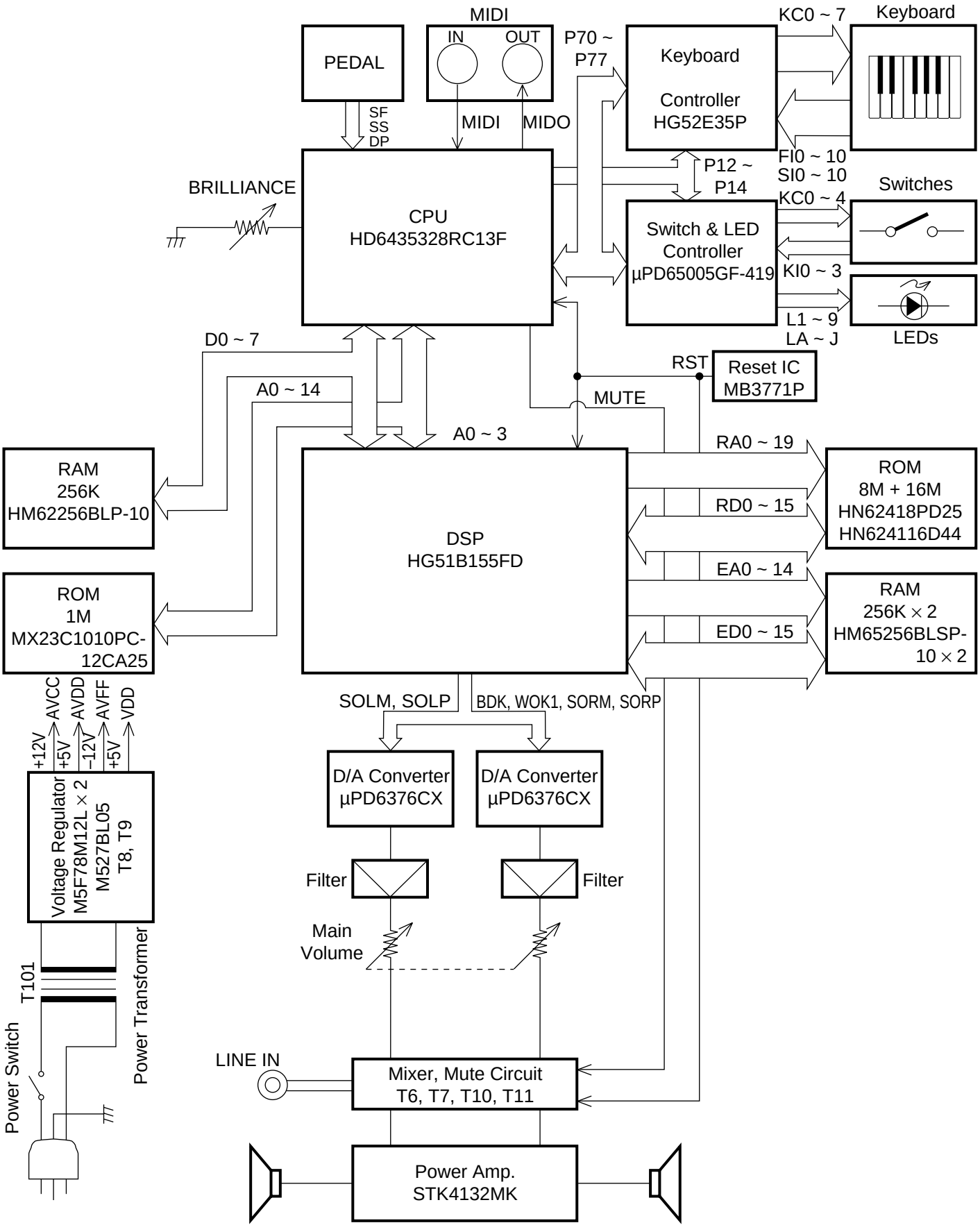
SPECIFICATIONS

GENERAL

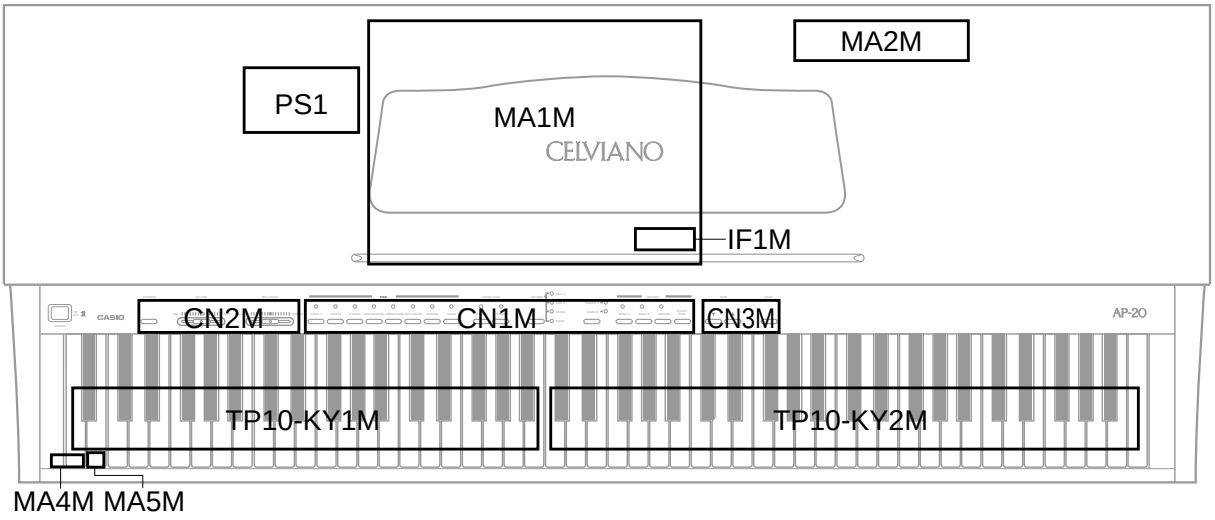
Number of keys	88
Polyphonic:	32-note
Preset tones:	10, PIANO 1, PIANO 2, ELEC. PIANO, HARPSICHORD, VIBRAPHONE, PIPE ORGAN, STRINGS, CHOIR, W.BASS (Lower tone only), E.BASS (Lower tone only) Layer/Split function
Key transpose:	$F^{\#}$-C-F
Keyboard controls:	Tuning curve, Baroque pitch
Temperaments:	Equal Temperament, Kirnberger III, Werckmeister, Mean-Tone, Just Intonation (Minor/Major), Pythagorean System
Effects:	Reverb (Room, Stage, Hall 1, Hall 2)/Chorus/Tremolo/Brilliance
Demo tunes:	8, 1. Polonaise "Héroïque" (F.F. Chopin) 2. Frühlingslied Op. 62-6 (F. Mendelssohn) 3. CASIO original 4. Harmonious blacksmith (G.F. Händel) 5. CASIO original 6. Jesus, Bleibet Meine Freude (J.S. Bach) 7. CASIO original 8. CASIO original
Memory:	Number of Songs: 2 (A and B) System: Real-time recording Memory Capacity: Approximately 3,000 notes total Memory Backup Battery: Built-in lithium battery Battery Life: Approximately 5 years
Pedals:	Soft, Sostenuto, Damper
Tuning control:	440Hz ±50 cents
Built-In Speakers:	16 cm dia. x 2 (Output: approx. 20 W + 20 W)
MIDI:	16-channel, multi-timbral reception
Terminals:	PHONES 1 and 2, MIDI (IN/OUT/THRU), LINE OUT L and R (Output Impedance: 10 KΩ; Output Voltage: 2 V, RMS, max.), LINE IN R and L (Input Impedance: 20 KΩ, Input sensitivity: 200 mV)
Power source:	120V (for U.S.A.), 120V, 220V, 230V and 240V (for other countries)
Power consumption:	65W (with 120V AC), 55W (with 220V, 230V and 240V AC)
Dimensions (HWD):	Without stand: 185 × 1340 × 520 mm (7-5/16 × 52-13/16 × 20-1/2 inches) With stand: 820 × 1360 × 550 mm (32-5/16 × 53-9/16 × 21-11/16 inches)
Weight:	Without stand: 35.5 kg (78.3 lbs)/38.5 kg (84.0 lbs) With stand: 45.5 kg (100.4 lbs)/48.5 kg (106.1 lbs)

Note: There are two models of AP-20, one has a keyboard cover, the other has no keyboard cover.

BLOCK DIAGRAM



PCB LAYOUT



Note: IF1M PCB is a terminal board for the keyboard PCBs, and included in the main PCB.

PCB	JCM433-	Components
Main PCB	MA1M	CPU, DSP, Sound Source ROM Working storage RAM, Effect RAM Reset IC, DAC, Filter, Key controller, Power amp, Power supply circuit
Jack PCBs	MA2M	LINE IN/OUT jack, MIDI jacks
	MA4M	Phone jacks
	MA5M	Power indicator
Console PCBs	CN1M	Gate array (Button controller/LED driver), LEDs, Buttons
	CN2M	Main Volume, Brilliance volume
	CN3M	Tune Buttons, Demo button
Power PCB	PS1	Fuse, Noise filter

DISASSEMBLY INSTRUCTIONS

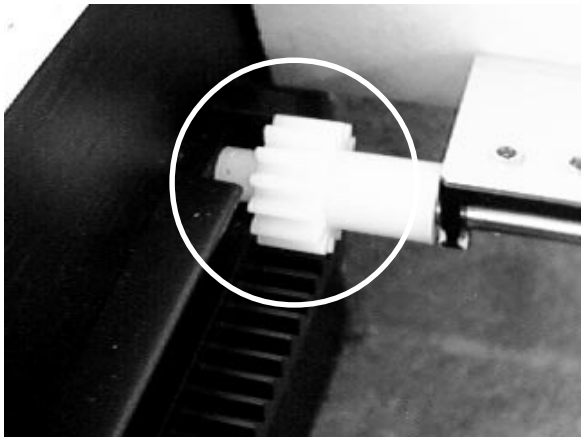
1. Disassembling top board

1-1. Remove 8 screws on the rear.
1-2. Slide the top board towards the rear.
The top board will be free from catches on the case.
1-3. Lift the top board.

For keyboard-cover model

2. Disassembling keyboard cover

2-1. Slide the keyboard cover to open fully.
2-2. Passing the gear into the opening on each rack, lift the keyboard cover.



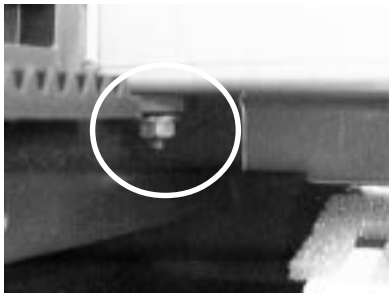
For no-keyboard-cover model

2. Disassembling the front cover

2-1. Remove 4 screws at both ends of the front cover.
2-2. Remove the front cover.

3. Disassembling console panel

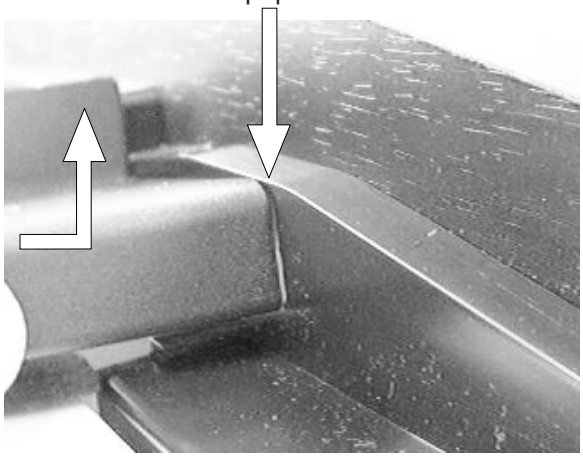
Note: To avoid scratch on the side board, put paper between the console panel and the side board at both ends.



3-1. The console panel is fixed with screws and nuts. Holding the nut, remove the screw.
3-2. Remove the screw fixing a grounding wire at the transformer.
3-3. Slide the console panel towards the front to free from catches.
3-4. Turn round the console panel.
3-5. Remove the 2 screws fixing the power switch.

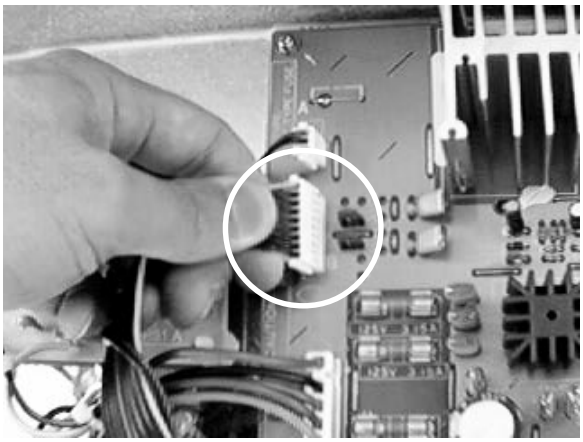
Insert paper here.

Insert paper here.



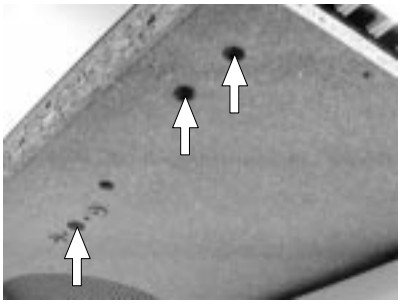
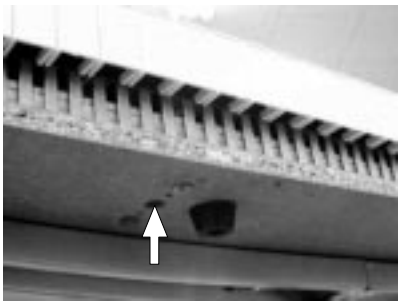
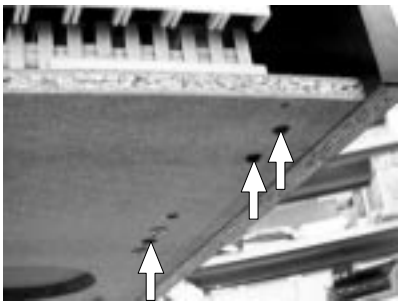
4. Disassembling front cover

4-1. Remove 5 screws at the front edge on the bottom.
4-2. Disconnect the connector for phone jacks from the main PCB.
4-3. Watching the phone-jack cable, pull out the front cover towards the front.

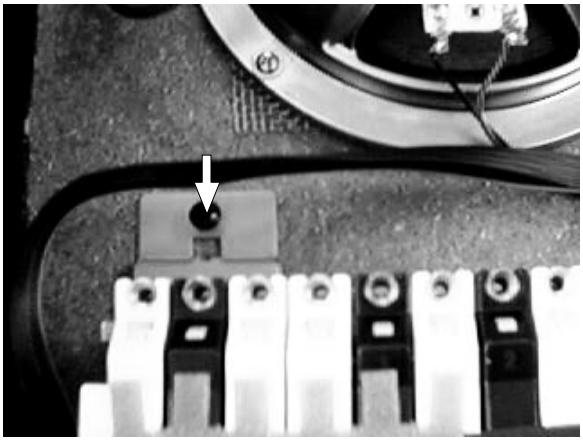
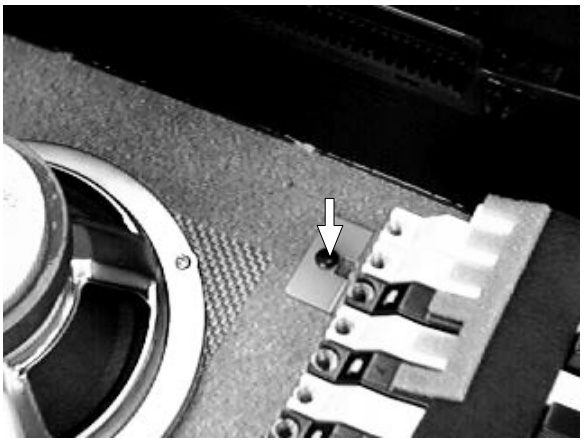


5. Disassembling keyboard unit

5-1. Remove 6 screws at both ends on the bottom, and a screw at the middle.

5-2. Remove 2 screws at both ends of keyboard unit.

5-3. Disconnect 2 connectors for the keyboard unit from the main PCB.

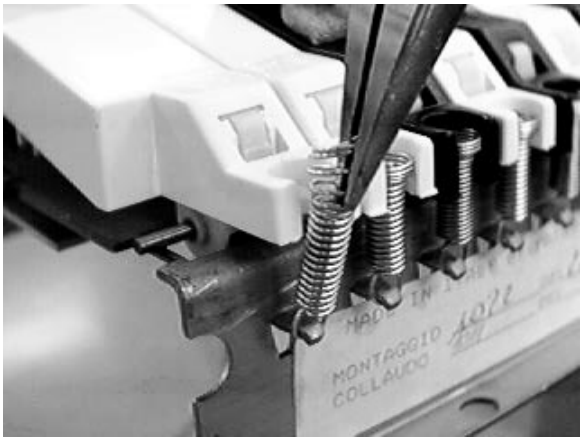
5-4. Moving the keyboard unit towards the front, remove the unit from the case.

6. Disassembling keys

6-1. Peel the red felt and sponges off the keyboard unit.

6-2. Using a long-nose plier, remove key springs.

6-3. Pressing the hook with a long-nose plier. Lift the key.

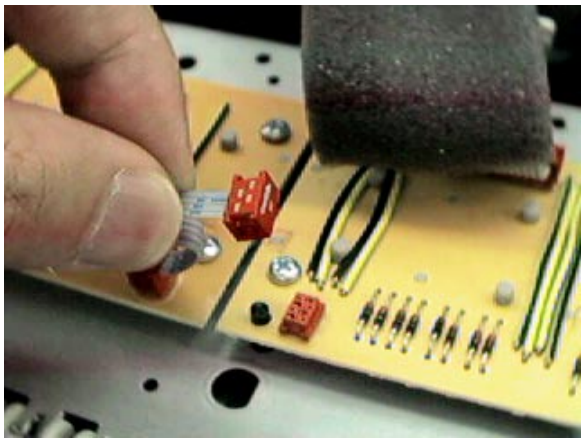


7. Disassembling keyboard PCBs

7-1. Turn round the keyboard unit to face the PCB up.

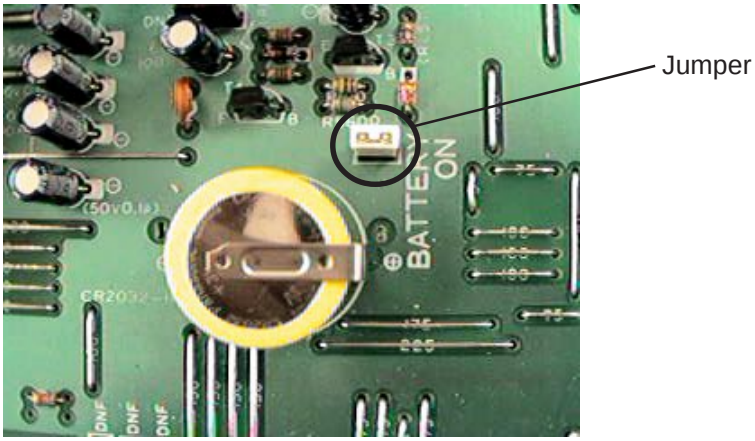
7-2. Disconnect the connector at the middle of keyboard.

7-3. Remove screws on the keyboard PCBs.



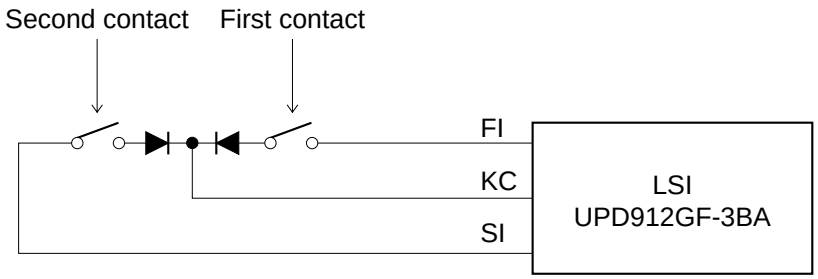
8. Replacing the main PCB

Note: The main PCB contains a lithium battery for memory back-up. Please remove the jumper before replacing the PCB. And make sure that the jumper is reset on new main PCB after replacing the PCB. Because no jumper is set on a spare part of the main PCB.



CIRCUIT DESCRIPTION

KEYMATRIX



	KC0	KC1	KC2	KC3	KC4	KC5	KC6	KC7
FI0	A0 ①	A0 # ①	B0 ①	C1 ①	C1 # ①	D1 ①	D1 # ①	E1 ①
SI0	A0 ②	A0 # ②	B0 ②	C1 ②	C1 # ②	D1 ②	D1 # ②	E1 ②
EI1	F1 ①	F1 # ①	G1 ①	G1 # ①	A1 ①	A1 # ①	B1 ①	C2 ①
SI1	F1 ②	F1 # ②	G1 ②	G1 # ②	A1 ②	A1 # ②	B1 ②	C2 ②
FI2	C2 # ①	D2 ①	D2 # ①	E2 ①	F2 ①	F2 # ①	G2 ①	G2 # ①
SI2	C2 # ②	D2 ②	D2 # ②	E2 ②	F2 ②	F2 # ②	G2 ②	G2 # ②
FI3	A2 ①	A2 # ①	B2 ①	C3 ①	C3 # ①	D3 ①	D3 # ①	E3 ①
SI3	A2 ②	A2 # ②	B2 ②	C3 ②	C3 # ②	D3 ②	D3 # ②	E3 ②
FI4	F3 ①	F3 # ①	G3 ①	G3 # ①	A3 ①	A3 # ①	B3 ①	C4 ①
SI4	F3 ②	F3 # ②	G3 ②	G3 # ②	A3 ②	A3 # ②	B3 ②	C4 ②
FI5	C4 # ①	D4 ①	D4 # ①	E4 ①	F4 ①	F4 # ①	G4 ①	G4 # ①
SI5	C4 # ②	D4 ②	D4 # ②	E4 ②	F4 ②	F4 # ②	G4 ②	G4 # ②
FI6	A4 ①	A4 # ①	B4 ①	C5 ①	C5 # ①	D5 ①	D5 # ①	E5 ①
SI6	A4 ②	A4 # ②	B4 ②	C5 ②	C5 # ②	D5 ②	D5 # ②	E5 ②
FI7	F5 ①	F5 # ①	G5 ①	G5 # ①	A5 ①	A5 # ①	B5 ①	C6 ①
SI7	F5 ②	F5 # ②	G5 ②	G5 # ②	A5 ②	A5 # ②	B5 ②	C6 ②
FI8	C6 # ①	D6 ①	D6 # ①	E6 ①	F6 ①	F6 # ①	G6 ①	G6 # ①
SI8	C6 # ②	D6 ②	D6 # ②	E6 ②	F6 ②	F6 # ②	G6 ②	G6 # ②
FI9	A6 ①	A6 # ①	B6 ①	C7 ①	C7 # ①	D7 ①	D7 # ①	E7 ①
SI9	A6 ②	A6 # ②	B6 ②	C7 ②	C7 # ②	D7 ②	D7 # ②	E7 ②
FI10	F7 ①	F7 # ①	G7 ①	G7 # ①	A7 ①	A7 # ①	B7 ①	C8 ①
SI10	F7 ②	F7 # ②	G7 ②	G7 # ②	A7 ②	A7 # ②	B7 ②	C8 ②

BUTTON MATRIX

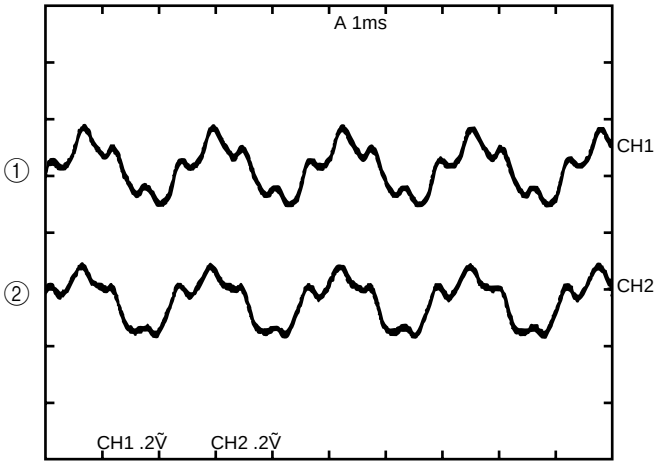
	KI0	KI1	KI2	KI3
KO0	Piano2	E. Piano	Harpsichord	W. Bass
KO1	Piano1	Strings	Choir	E. Bass
KO2	Vibraphone	Pipe organ	Reverb	
KO3	Song A	Song B	Record	Start/Stop
KO4	Control	Tune up	Tune down	Demo

POWER SUPPLY CIRCUIT

The power supply circuit generates four voltages as shown in the following table.

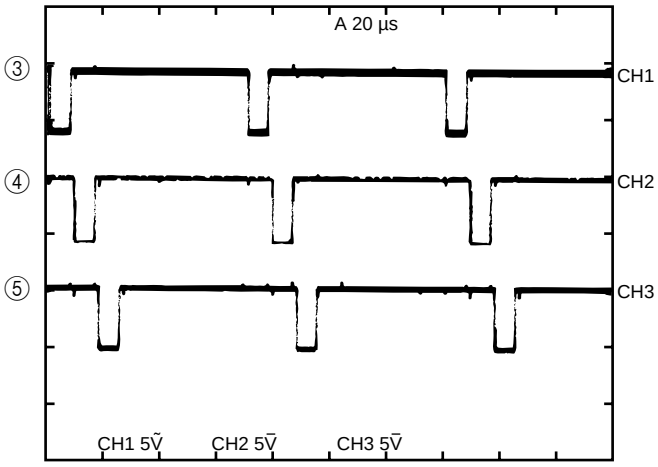
Name	Voltage	For operation of
VDD	+5 V	CPU, Reset IC, Working storage RAM, DSP, Key touch LSI, Sound source ROM, Effect RAM, Gate array
AVDD	+5 V	DAC
AVCC	+12 V	Filter, Mixer
AVFF	-12 V	Filter, Mixer

MAJOR WAVEFORMS

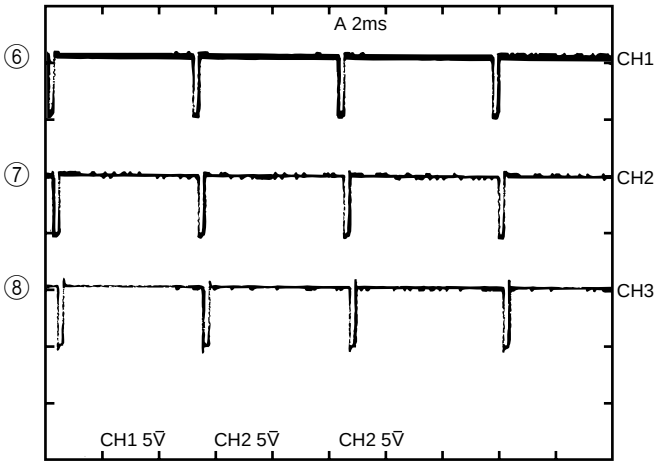


① Filter output L-ch CC connector pin 1
② Filter output R-ch CC connector pin 2

Tone : Piano 1
Key : A4



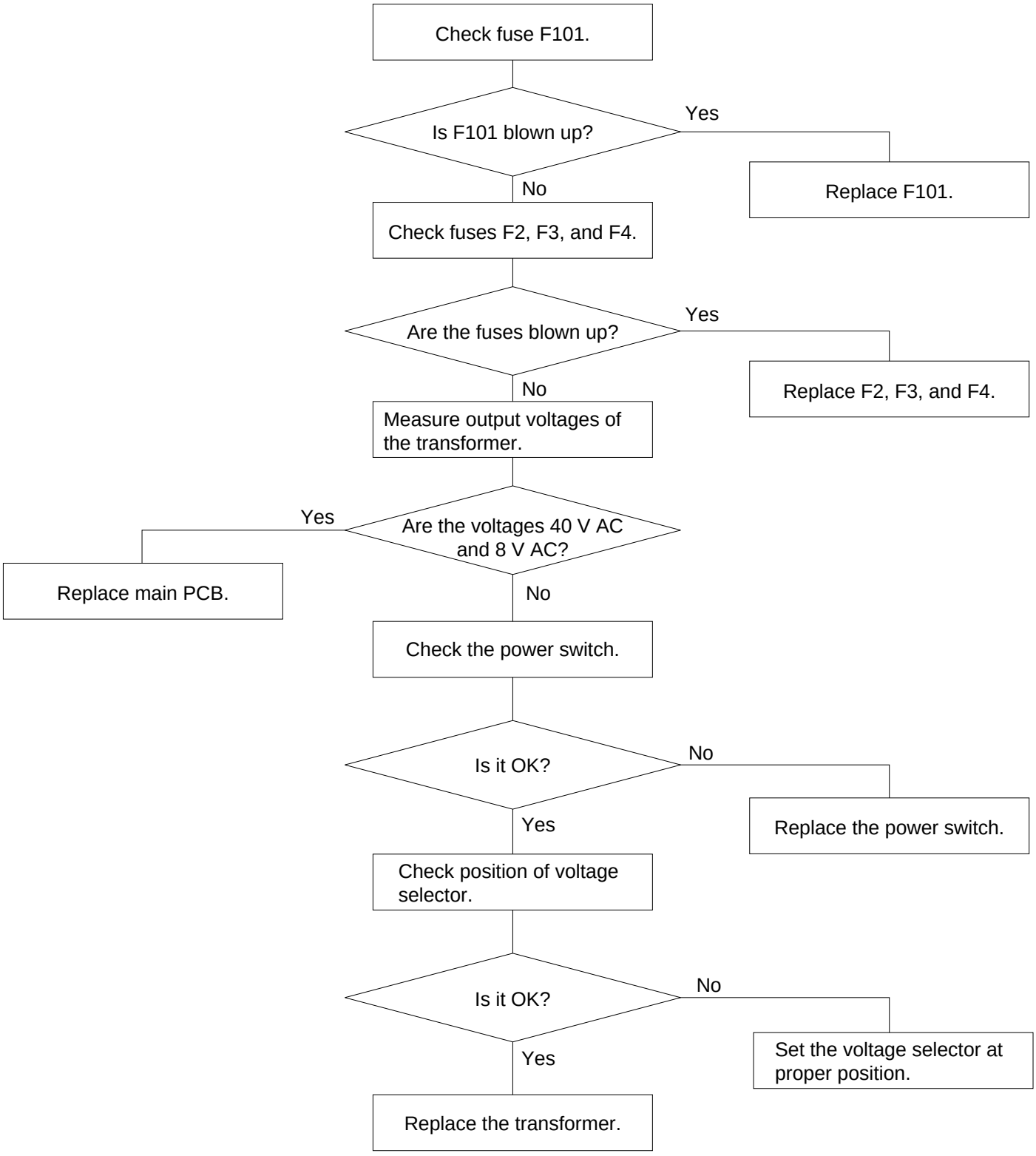
③ Key scan signal KC0 JA connector pin 5
④ Key scan signal KC1 JA connector pin 4
⑤ Key scan signal KC2 JA connector pin 3



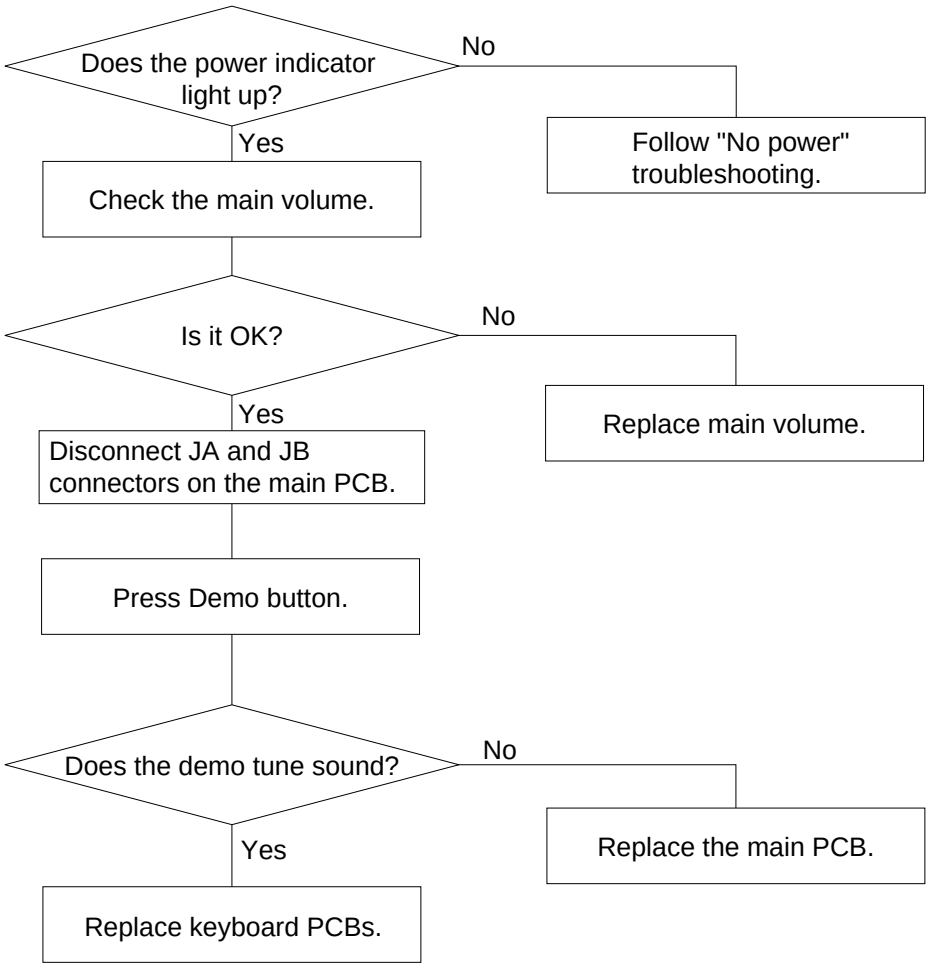
⑥ Button scan signal KC0 UPD65005GF-419 pin 53
⑦ Button scan signal KC1 UPD65005GF-419 pin 54
⑧ Button scan signal KC2 UPD65005GF-419 pin 55

TROUBLESHOOTING

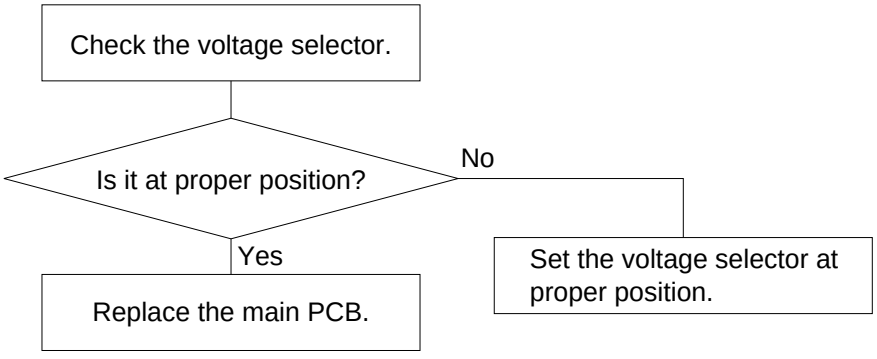
1. No power



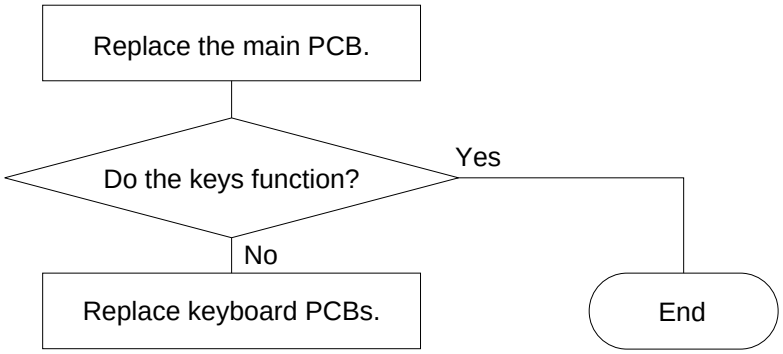
2. No sound



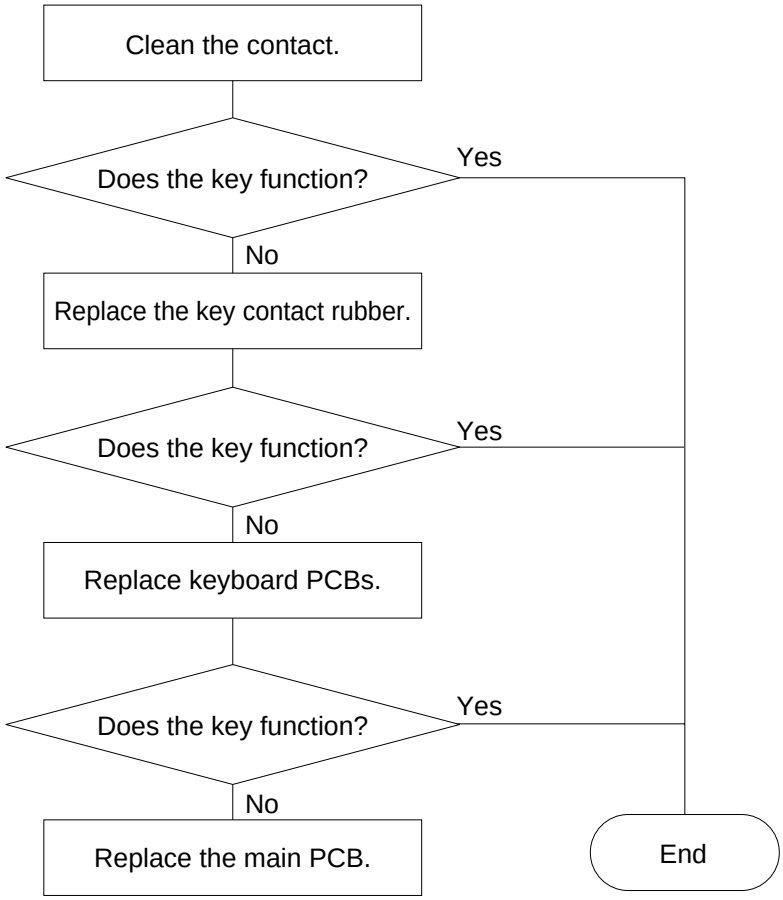
3. Distorted sound



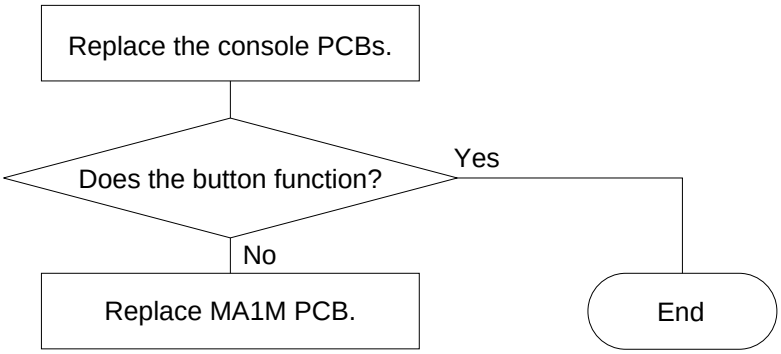
4. Certain keys do not function



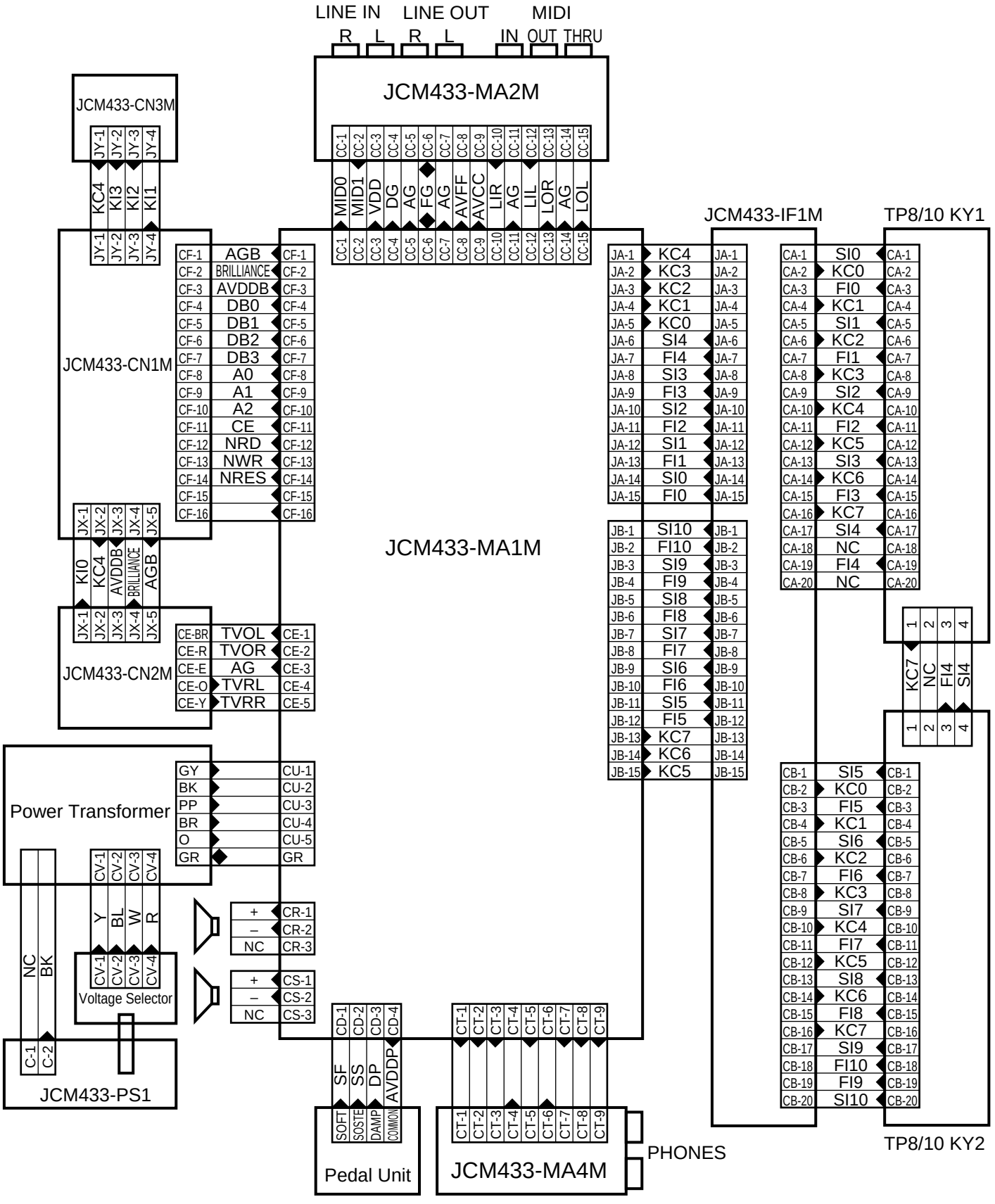
5. A certain key does not function



6. A certain button does not function

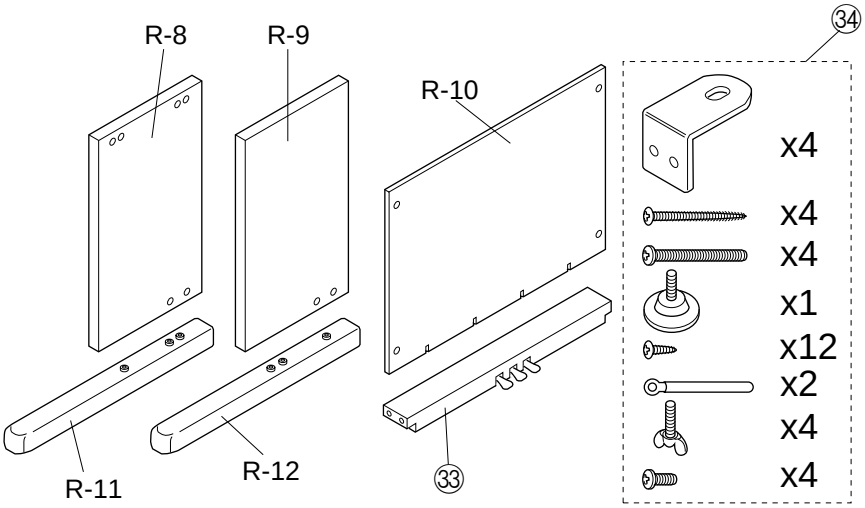


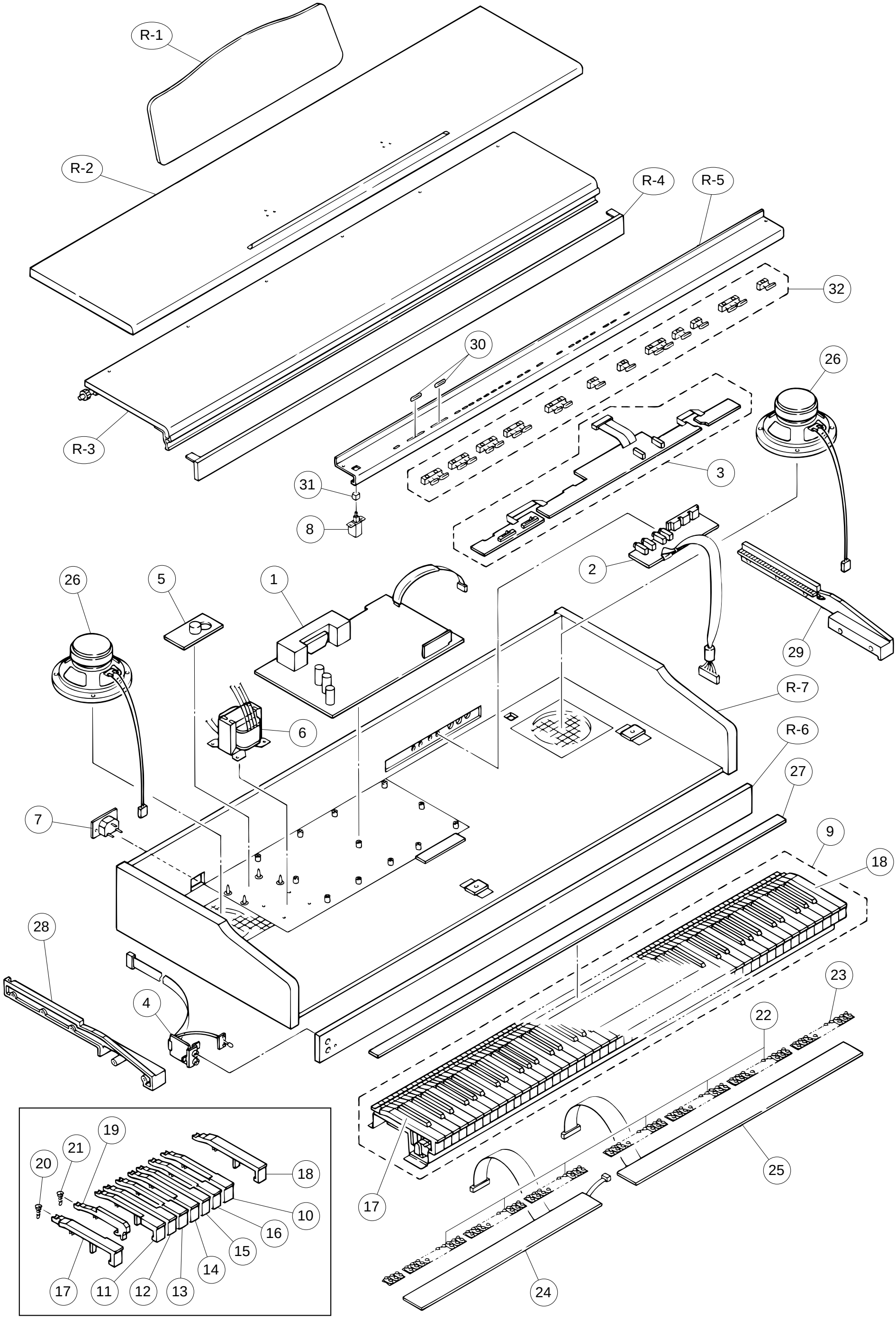
WIRING DIAGRAM



EXPLODED VIEW

STAND




R-1
R-2
R-3
R-4
R-5
R-6
R-7
32
30
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31
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29
26
5
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13

PARTS LIST

AP-20

Notes: This parts list does not include the cosmetic parts, which parts are marked with item No. "R-X" in the exploded view.
Contact our spare parts department if you need these parts for refurbish.

1. Prices and specifications are subject to change without prior notice.

2. As for spare parts order and supply, refer to the "GUIDEBOOK for Spare parts Supply", published seperately.

3. The numbers in item column correspond to the same numbers in drawing.

N	Item	Code No.	Parts Name	Specification	Q	FOB Japan N.R.Yen Unit Price	R
		Main PCB					
		2200 4409	Transistor	2SA933-SQ-TP-T	3	8	B
		2220 1387	Transistor	2SC1740SQ-TP-T	2	8	B
		2240 1050	FET	2SK163N-T	4	31	B
		2360 0273	Zener diode	RD3.3ESB1-T1-T	1	8	B
		2360 1694	Zener diode	RD6.2ESB1-T1-T	1	8	A
		2011 0455	LSI, RAM	HM65256BLSP-10	2	450	A
		2011 3325	LSI, DAC	UPD6376CX	2	190	A
		2011 5194	LSI, Key controller	HG52E35P	1	540	A
		2011 5208	LSI, ROM, Sound source	HN624116PD44	1	1,260	A
		2011 5222	LSI, CPU	HD6435328RC13F	1	1,260	A
		2011 5236	LSI, ROM, Sound source	HN62418PD25	1	870	A
		2011 7434	LSI, DSP	HG51B155FD	1	1,160	A
N		2012 0560	LSI, RAM	HM62256BLP-10.8	1	600	A
		2012 2093	LSI, ROM	MX23C1010PC-12CA25	1	290	A
		2101 0731	IC, NADD gate	TC74HC10AP	1	32	B
		2105 1092	IC, NOT gate	TC74HC04AP	1	30	B
		2114 0021	IC, OP-amp.	LA6462D	5	39	B
		2114 0140	IC, Reset	MB3771P	1	90	B
		2114 0854	IC, Regulator	M5278L05	1	78	A
		2114 1106	IC, Hybrid, Power amp.	STK4132MK2	1	650	A
		2114 1113	IC, Regulator	M5F78M12L	1	91	A
		2114 2163	IC, Regulator	M5F79M12L	1	78	A
		2230 5229	Transistor	2SD1666R,S	1	60	A
		2390 2366	Diode stack	S4VB20-4033(L10)	1	190	B
		2529 2034	Ceramic oscillator	CSA20.00MX040	1	52	B
		2590 1519	Crystal oscillator	HC-49U16384	1	100	B
		3815 0707	Lithium battery	CR2032-1HM	1	96	B
		3631 1070	Fuse, Time-lag	(S)T-3.15A	1	39	A
		3631 1045	Fuse, Time-lag	(S)T-1.6A	1	62	A
		3632 0231	Fuse, Time-lag	UL-TSC-3.15A-N1	1	61	A
		3632 0273	Fuse, Time-lag	UL-TSC-1.6A-N1	1	61	A
N	1	6924 7790	Main PCB ass'y M433-MA1M	M140334*2	1	14,470	A
		Sub PCB					
		2105 1092	IC, NOT gate	TC74HC04AP	1	30	B
		2114 0021	IC, OP-amp.	LA6462D	1	39	B
		2114 1421	IC, Photocoupler	PC900V	1	100	B
		3501 4802	DIN jack	YKF51-5052	1	120	B
		3612 0789	Jack, Line IN/OUT	YKB21-5010	4	35	A
N	2	6924 4670	Sub PCB ass'y M433-MA2M	M240332*1	1	2,170	A
		Console PCB					
		2370 0630	LED	LN282RPX-(TX3)	19	21	B
		3412 0903	Tact switch	EVQ-21405R	20	14	A
		2011 0812	LSI, Gate array, LED driver	UPD65005GF-419	1	220	B
		2765 0280	Slide volume	EWA-NAXCH1B14	1	100	A
		2765 1288	Slide volume	EWA-NAXCH1B54	1	100	A
N	3	6924 4760	Console PCB ass'y M433CN-123M	M140336*1	1	2,150	A
		Jack PCB					
		2320 9748	LED	LN28RPH	1	20	B
N		3613 1533	Jack, Phone	HLJ4336-01-3040	1	170	A
	4	6924 4690	M433MA4,5M-PCBASSY	M240334*1	1	900	B
		Power PCB					
		3632 0287	Fuse, Time-lag	(S)T-0.63A	1	49	A
N		3632 0280	Fuse, Time-lag	MT4-1.6A-N1	1	64	A
N	5	6924 7810	Power PCB M433-PS1	M240333*2	1	890	C

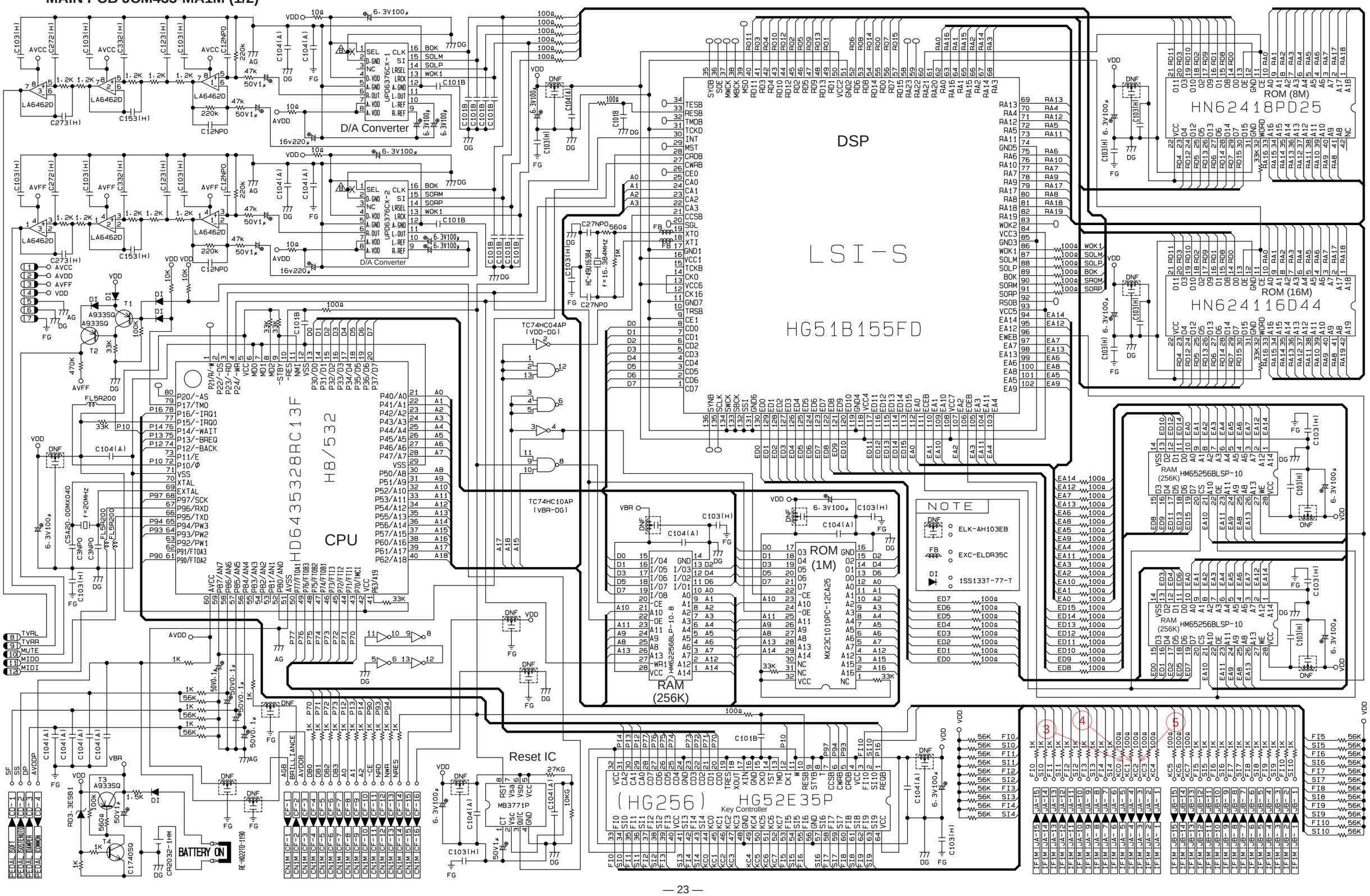
Notes: N – New parts
R – Rank

N	Item	Code No.	Parts Name	Specification	Q	FOB Japan N.R.Yen Unit Price	R
		Other electrical parts					
	6	3012 0567	Transformer	TE-351-1M1	1	2,040	B
	7	3613 0217	Receptacle	NC-174-10-C	1	110	B
N	8	3412 1827	Power switch	SDDLD1-A2-D	1	130	A
		Keyboard unit					
N	9	6924 1820	Keyboard unit	88TP/10CASIO	1	13,340	B
N	10 - 16	6924 9150	White key set, 1-octave	88TP10(42120120)	7	540	A
N	19	6924 9150	Black key, 1-octave	88TP10(42120030)	7	540	A
N	20	6924 9160	Spring, for white key	88TP10(23100820)	52	15	B
N	21	6924 9170	Spring, for black key	88TP10(23100810)	36	15	B
N	22	6924 9190	Contact, rubber, for key, 12	88TP10/8(2564230)	6	150	A
N	23	6924 9200	Contact, rubber, for key, 13	88TP10/8(2564240)	1	160	A
N	24	6924 9060	Keyboard PCB (DX)	88TP10/8(42912070)	1	2,800	C
N	25	6924 9070	Keyboard PCB (SX)	88TP10/8(42912080)	1	3,500	C
		Mechnical parts					
	26	3831 0546	Speaker	EAS-16PL465A	2	1,250	B
	27	6906 6141	Felt for keyboard	M410324A-4	1	140	B
		6919 7410	Sponge for felt	M411750-1	8	19	B
	28	6924 5390	Rack L	1037153000	1	170	B
	29	6924 5410	Rack R	1037154009	1	170	B
	30	6919 3241	Slide knob A 353	M311405A-1	2	17	B
	31	6924 5260	Button, power switch	M340318-1	1	13	B
N	32	6924 5600	Button set 433	M240304*1	1	170	B
		Stand					
	33	6924 7050	Pedal box ass'y	A190007400	1	5,120	B
N	34	6924 7060	Screw set for AP-20's stand	A190007500	1	600	B
		AC cord					
		3701 0196	AC cord (120V, USA)	UC-964-J01	1	650	B
		3701 0595	AC cord (230V, Europe)	EC-654-E06	1	720	B
		3701 0588	AC cord (230V, UK)	BC-323-J01	1	860	B
N		3701 0553	AC cord (240V, Australia)	SC-101-J02	1	660	B

Notes: N – New parts
R – Rank

SCHEMATIC DIAGRAMS

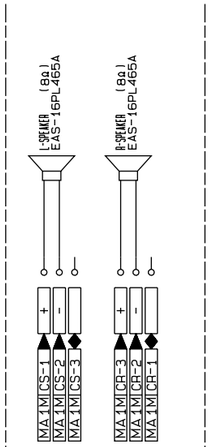
MAIN PCB JCM433-MA1M (1/2)

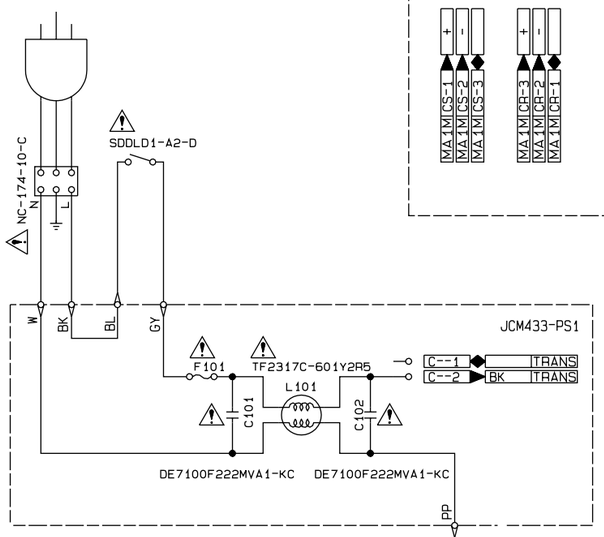


MAIN PCB JCM433-MA1M (2/2), PHONE JACK PCBs JCM433-MA4M, MA5M and POWER PCBs JCM433-PS1

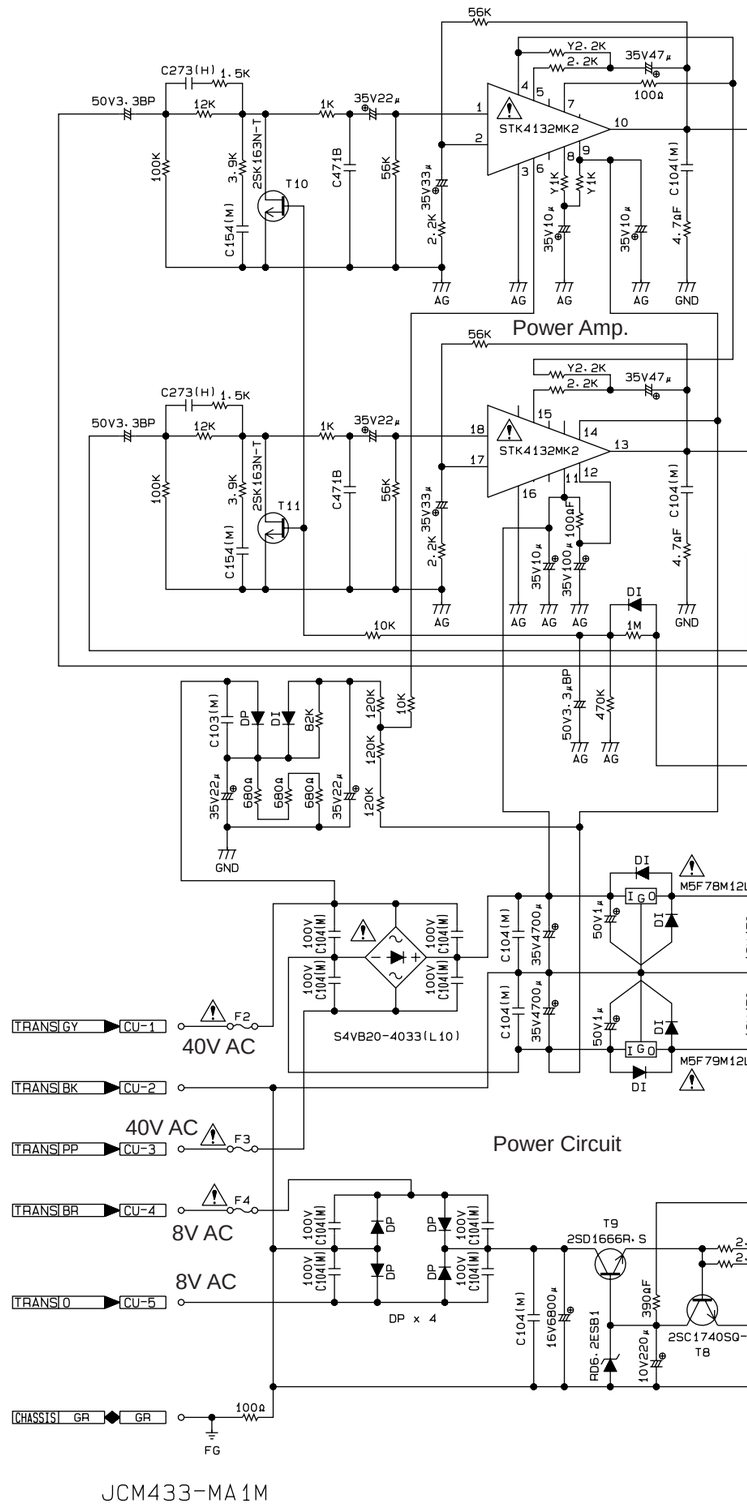
NOTE

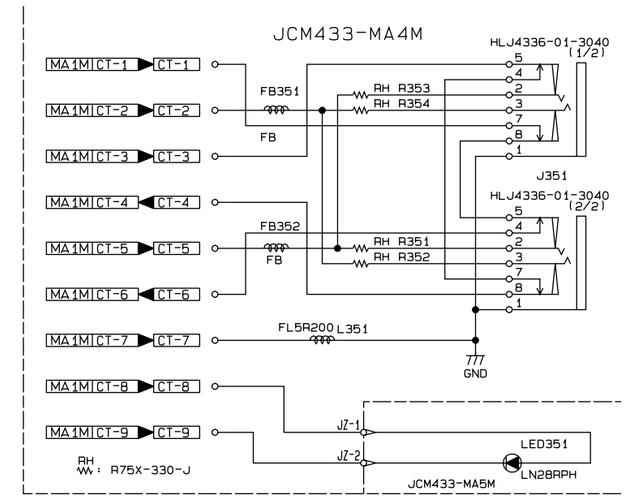
EF	EXC-EMT222DT-T
PC	EXC-ECT223ZVT-T
FB	EXC-ELDR35V-T
DI	1SS133T-77-T
DP	DSK10B-BT-T

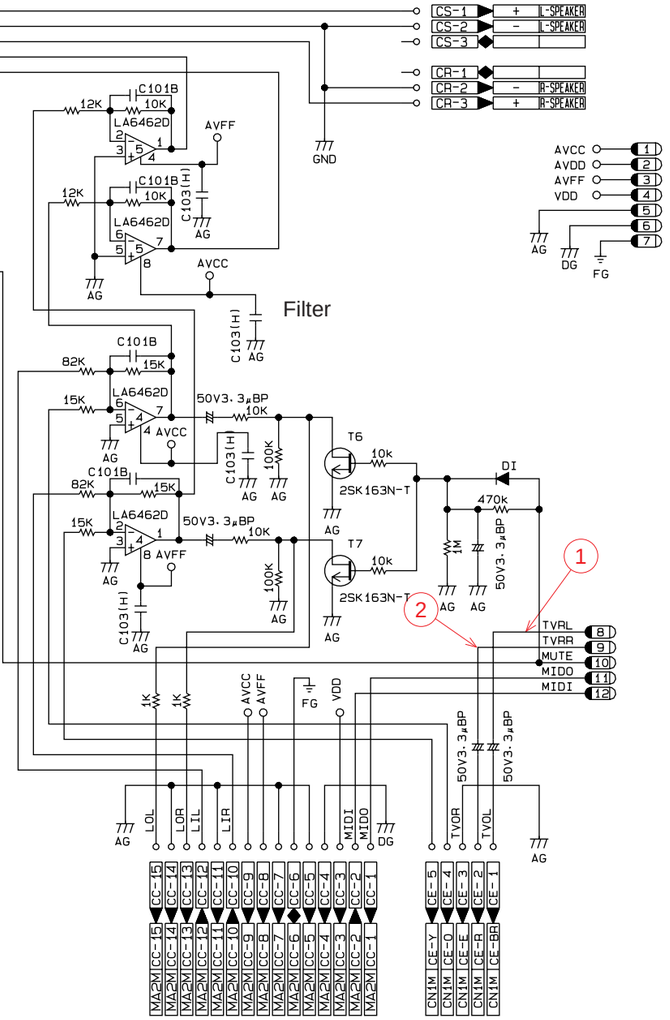




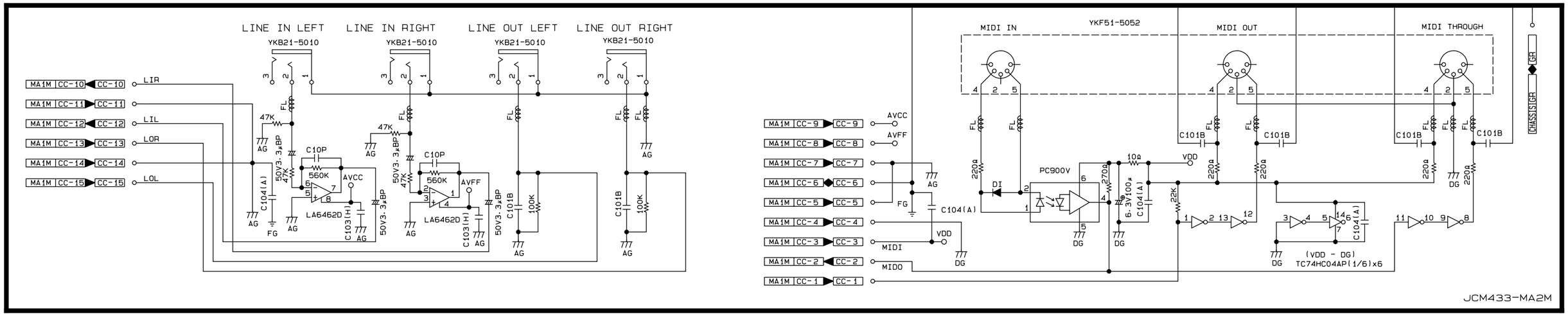
Ass'Y / Fuse	AC 120V	AC 230V/240V
F101	MT4-1.6A-N1	(S)T-0.63A
F2	UL-TSC-3.15A-N1	(S)T-3.15A
F3	UL-TSC-3.15A-N1	(S)T-3.15A
F4	UL-TSC-1.6A-N1	(S)T-1.6A

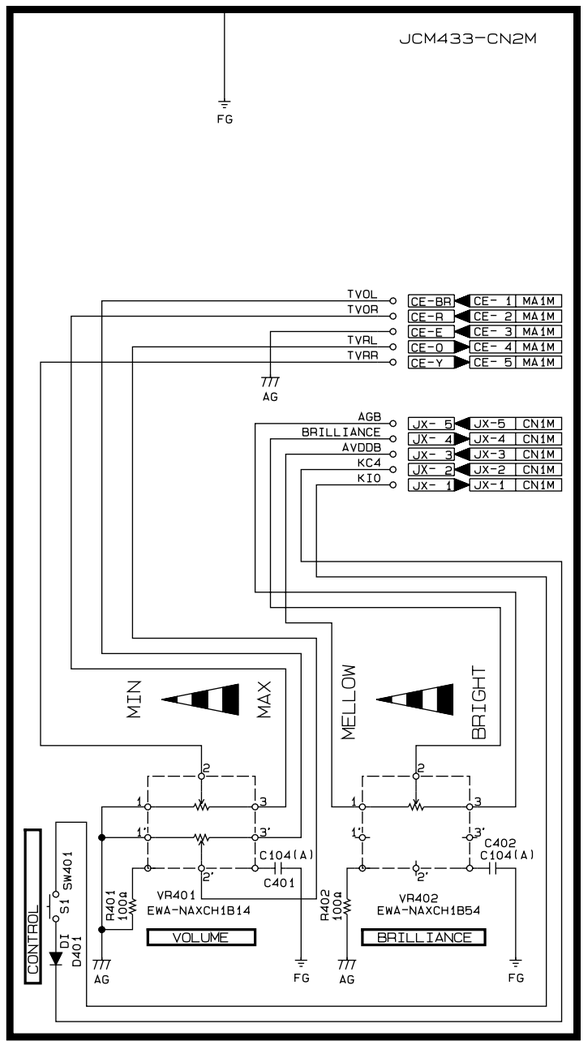




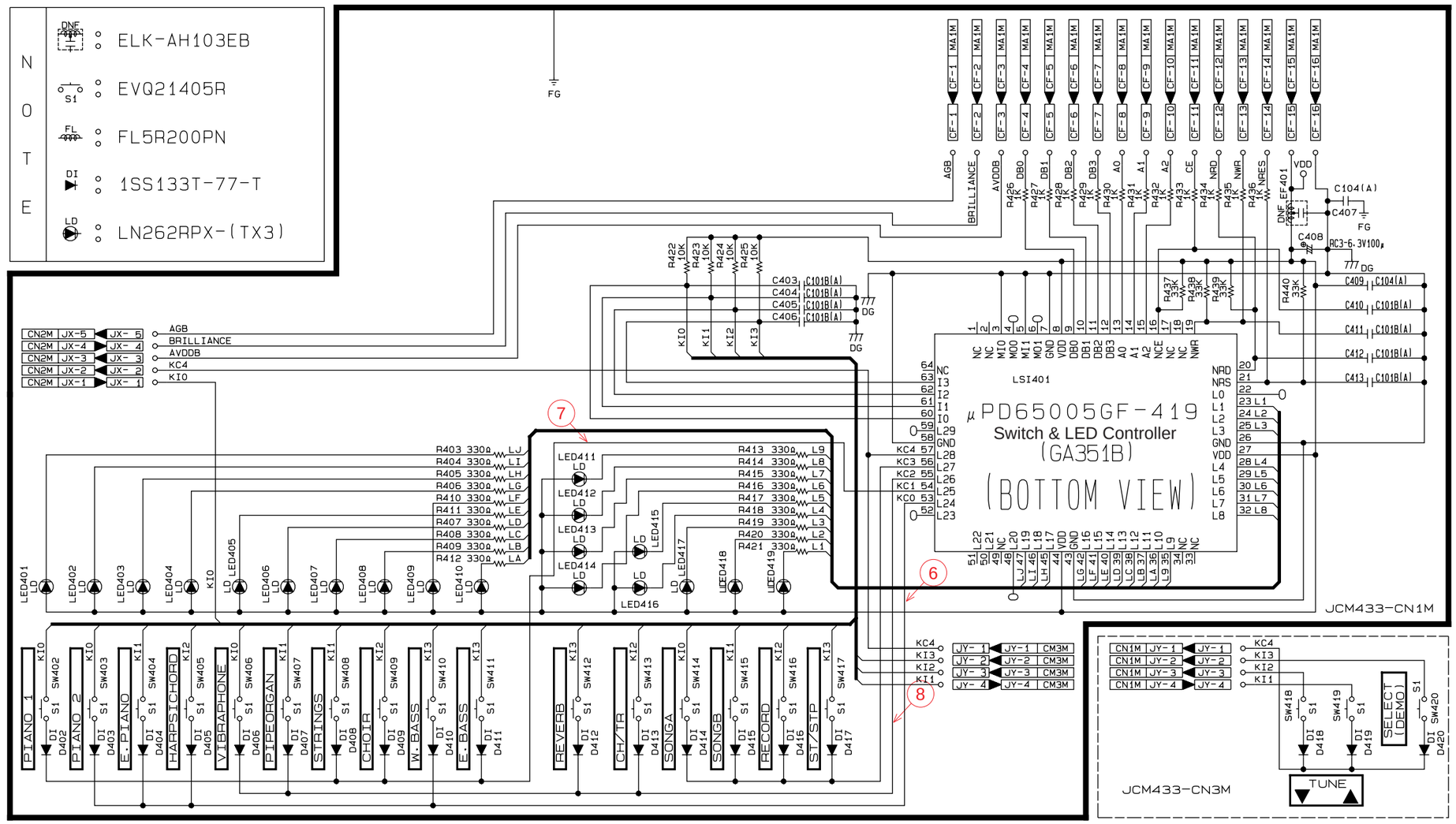


CONSOLE PCBs JCM433-CN1M, 2M, 3M, and JACK PCB JCM433-MA2M

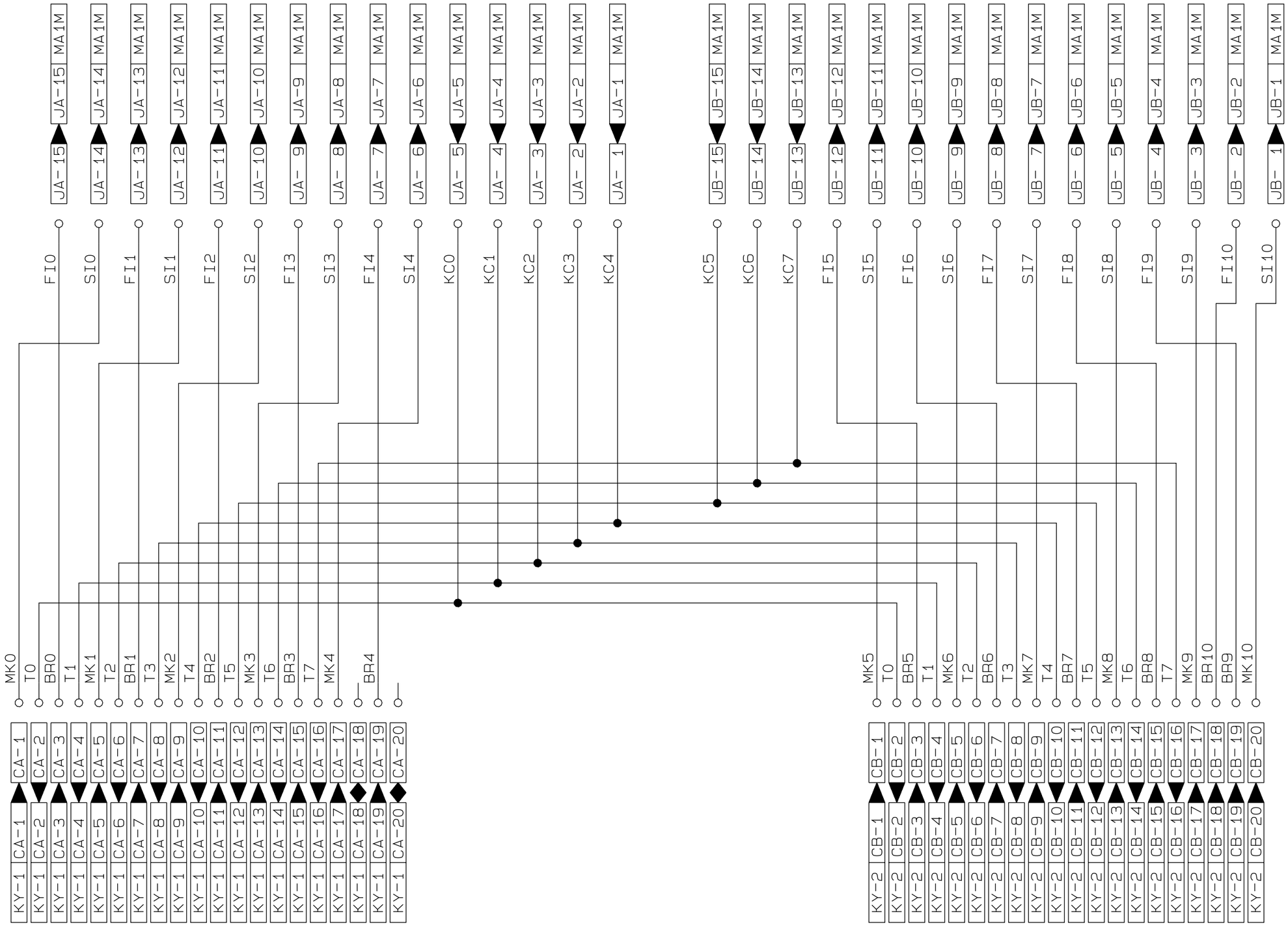




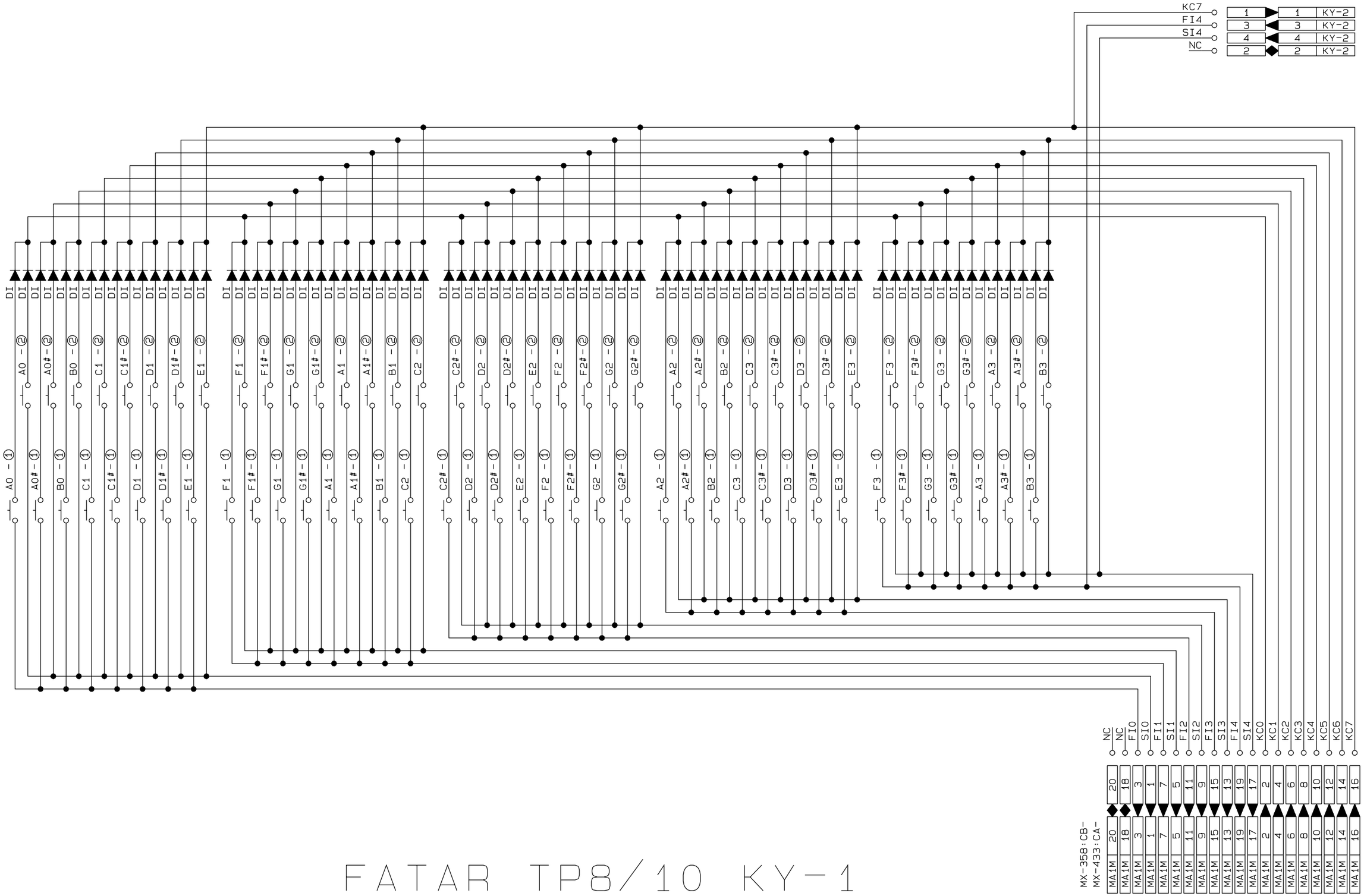
NOTE	DNF	ELK-AH103EB
	S1	EVQ21405R
	FL	FL5R200PN
	DI	1SS133T-77-T
	LD	LN262RPX-(TX3)



INTERFACE PCB JCM433-IF1M

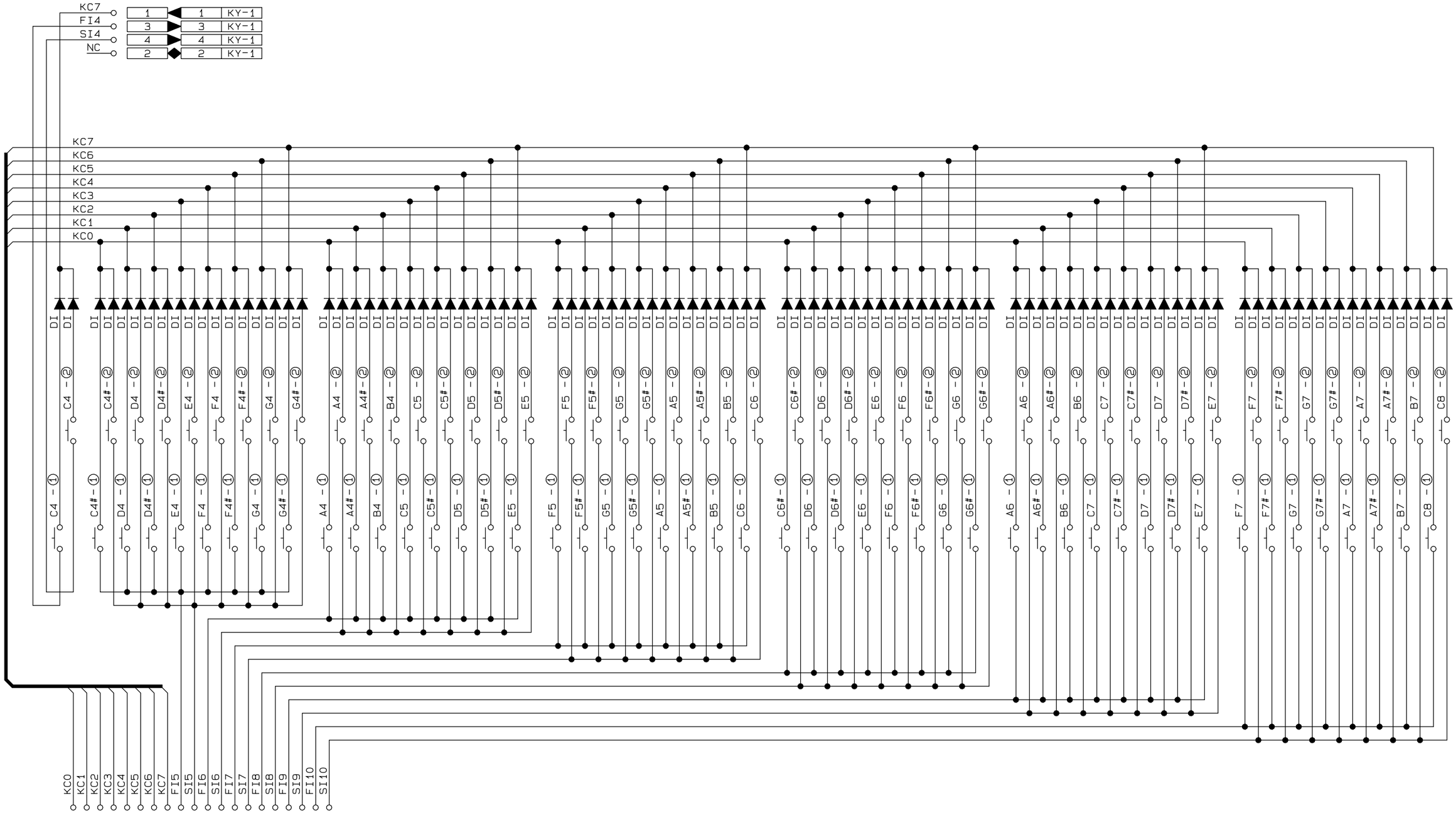


KEYBOARD PCB TP8/10 KY-1



FATAR TP8/10 KY-1

KEYBOARD PCB TP8/10 KY-2



FATAR TP8/10 KY-2